Replacement Lakeside EfW and HTI Facilities

Noise and vibration assessment

June 2019

GRUNDON

Viridor

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Noise and vibration assessment

LAKESIDE EFW

RAMBOLL

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Ramboll UK Limited
Carlton House
Ringwood Road
Woodlands
Southampton
SO40 7HT
United Kingdom

T +44 (0) 238 081 7500
F +44 (0) 845 299 1610
www.ramboll.co.uk

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1. INTRODUCTION

1.0.1 Lakeside EfW Ltd is a joint venture between Grundon Waste Management Limited and Viridor. It operates the existing Lakeside Road Energy from Waste (EfW) facility in Colnbrook, Slough. Grundon Waste Management is the sole owner and operator of the High Temperature Incinerator (HTI) adjoined to the EfW on Lakeside Road. Lakeside EfW Ltd, Grundon Waste Management Limited and Viridor (hereafter collectively referred to as "Lakeside EfW Ltd") are applying to Slough Borough Council (SBC) for full planning permission for the construction and operation of a replacement energy from waste facility and high temperature incinerator including ancillary buildings and structures, provision of a new access road and new junction with the A4, and temporary construction compound. In order to support the planning application Ramboll UK Limited (Ramboll) was appointed by Lakeside EfW Ltd to undertake a Noise and Vibration Assessment.

2. PLANNING POLICY CONTEXT

2.1 National Planning Policy Framework, 2018

2.1.1 No specific noise criteria are set out in the National Planning Policy Framework (NPPF)[1] or in the Noise Policy Statement for England[2] (NPSE) to which it refers. Regarding noise, the NPPF states that the planning system should contribute to and enhance the natural and local environment by preventing both new and existing development from contributing to, or being put at unacceptable risk from, or being adversely affected by, unacceptable levels of noise pollution.

2.1.2 Paragraph 180 of the NPPF states that:

Planning policies and decisions should also ensure that new development is appropriate for its location taking into account the likely effects (including cumulative effects) of pollution on health, living conditions and the natural environment, as well as the potential sensitivity of the site or the wider area to impacts that could arise from the development. In doing so they should:

a) mitigate and reduce to a minimum potential adverse impacts resulting from noise from new development – and avoid noise giving rise to significant adverse impacts on health and the quality of life;
b) identify and protect tranquil areas which have remained relatively undisturbed by noise and are prized for their recreational and amenity value for this reason…'

2.1.3 To achieve these aims, the NPPF refers to the explanatory note to the NPSE.

2.2 Noise Policy Statement for England, 2010

2.2.1 The NPSE sets out the long-term vision of Government noise policy which is to promote good health and a good quality of life through the effective management of noise within the context of Government policy on sustainable development.

2.2.2 The NPSE outlines the following three aims for the effective management and control of mental, neighbour and neighbourhood noise:

i. Avoid significant adverse impacts on health and quality of life;

[1] Department for Communities and Local Government, 2018. National Planning Policy Framework. HMSO.
[2] Department of Environment, Food and Rural Affairs, 2010. Noise Policy Statement for England.

ii. Mitigate and minimise adverse impacts on health and quality of life; and

iii. Where possible, contribute to the improvement of health and quality of life.

2.3 Planning Practice Guidance

2.3.1 Planning Practice Guidance[3] (PPG) is a web-based resource, which includes a section on noise. This resource provides guidance on how to determine the noise impact in terms of whether a significant adverse effect is likely to occur and/or whether a good standard of amenity can be achieved.

2.3.2 In line with the Noise Policy Statement for England, Planning Practice Guidance introduces the following concepts:

i. Significant observed adverse effect level (SOAEL): This is the level of noise exposure above which significant adverse effects on health and quality of life occur;
ii. Lowest observed adverse effect level (LOAEL): this is the level of noise exposure above which adverse effects on health and quality of life can be detected; and
iii. No observed effect level (NOEL): this is the level of noise exposure below which no effect at all on health or quality of life can be detected.

2.3.3 Table 2.1 summarises the noise exposure hierarchy, based on the likely average response.

Table 2.1 Noise Exposure Hierarchy

Perception	Examples of outcome	Increasing effect level	Action
Not noticeable	No effect	No Observed Effect	No specific measures
Noticeable and not intrusive	Noise can be heard but does not cause any change in behaviour or attitude. Can slightly affect the acoustic character of the area but not such that there is a perceived change in the quality of life.	No Observed Adverse Effect	No specific measures required
Lowest Observed Adverse Effect Level			
Noticeable and intrusive	Noise can be heard and causes small changes in behaviour and/or attitude, e.g. turning up volume of television; speaking more loudly; where there is no alternative ventilation, having to close windows for some of the time because of the noise. Potential for some reported sleep disturbance. Affects the acoustic character of the area such that there is a perceived change in the quality of life.	Observed Adverse Effect	Mitigate and reduce to a minimum
Significant Observed Adverse Effect Level			
Noticeable and disruptive	The noise causes a material change in behaviour and/or attitude, e.g. avoiding certain activities during periods of intrusion; where there is no alternative ventilation, having to keep windows closed most of the time because of the noise. Potential for sleep disturbance resulting in difficulty in getting to sleep, premature awakening and difficulty in getting back to sleep. Quality of life diminished due to change in acoustic character of the area.	Significant Observed Adverse Effect	Avoid

[3] GOV.UK. 2018. Noise. [ONLINE] Available at: https://www.gov.uk/guidance/noise--2. [Accessed 01 April 2019].

Perception	Examples of outcome	Increasing effect level	Action
Noticeable and very disruptive	Extensive and regular changes in behaviour and/or an inability to mitigate effect of noise leading to psychological stress or physiological effects, e.g. regular sleep deprivation/awakening; loss of appetite, significant, medically definable harm, e.g. auditory and non-auditory	Unacceptable Adverse Effect	Prevent

2.4 Local Planning Policy

2.4.1 In our assessments, consideration was given to the Slough Borough Council Local Development Framework Core Strategy 2006-2026[4], and specifically to Core Policy 8 (Sustainability and the Environment), and Policy EMP2 (Criteria for Business Developments).

2.5 Other Guidance

British Standard 4142: 2014 Method for rating and assessing industrial and commercial sound

2.5.1 BS 4142:2014[5] provides a method for rating industrial and commercial sound and method for assessing resulting impacts upon people. The method is applicable to fixed plant installations, sound from industrial and manufacturing process and other associated activities.

2.5.2 The basis of BS4142 is a comparison between the background noise level in the vicinity of residential locations and the rating level of the noise source under consideration. The relevant parameters in this instance are as follows:

i. Background Level, $L_{A90,T}$: defined in the Standard as the 'A' weighted sound pressure level that is exceeded by the residual sound at the assessment location for 90% of a given time interval, T, and quoted to the nearest whole number of decibels;
ii. Specific Level, $L_{Aeq,T}$: the equivalent continuous 'A' weighted sound pressure level at the assessment location in the absence of the specific sound source under consideration, over a given time interval, T; and
iii. Rating Level, $L_{Ar,T}$: the specific sound level plus any adjustment made for the characteristic features of the noise.

2.5.3 Potential impacts are predicted from the difference between the representative background level at a noise sensitive receptor and the rating level from the noise source considered. The standard suggests that the greater the difference, the greater the magnitude of impact.

2.5.4 In determining the significance of the impact, BS 4142 requires a consideration of the context of the assessment i.e. the nature of the existing acoustic environment and the new noise source, and the sensitivity of the affected receptors.

British Standard 5228: 2009+A1: 2014 Code of Practice for Noise and Vibration Control on Construction and Open Sites Parts 1 and 2

[4] Slough Borough Council, 2013. Slough Local Development Framework Core Strategy 2006-2026

[5] British Standards Institute, 2014. British Standard BS 4142: Methods for rating and assessing industrial and commercial sound. BSI.

2.5.5 BS 5228:2009[6] gives recommendations for basic methods of noise and vibration control relating to construction work. It also provides guidance concerning methods of predicting and measuring noise and vibration and assessing their impacts on those exposed to it. The prediction method considers the noise emission level of proposed plant, the separation distance between the source and the receiver and the effect of the intervening topography and structures.

2.5.6 Part 2 of the standard gives recommendations for basic methods of vibration control relating to construction and open sites where work activities/operations generate significant vibration.

2.5.7 The legislative background to vibration control is described and recommendations are given regarding procedures for the establishment of effective liaison between developers, site operators and local authorities. The standard also provides guidance on measuring vibration and assessing its effects on the environment.

Calculation of Road Traffic Noise (1988)

2.5.8 Calculation of Road Traffic Noise[7] (CRTN) sets out standard procedures for calculating noise levels from road traffic. The calculation method uses a number of input variables, including traffic flow volume, average vehicle speed and percentage of heavy goods vehicles (HGVs), to predict the $L_{A10,18hour}$ or $L_{A10,1hour}$ noise level for any receptor point at a given distance from the road.

The Highways Agency (2011) Design Manual for Roads and Bridges (DMRB) Volume 11, Part 3, Section 7

2.5.9 The Design Manual for Roads and Bridges[8] (DMRB) provides advice on the assessment of noise and vibration impacts due to road traffic. The guidance provides a classification of magnitude of impacts related to changes in road traffic noise levels. As people are less sensitive to noise level changes over time, the classification of impacts is provided in the short term and in the long term. People typically acclimatise to road traffic noise over time, so that the effects are reduced in the long-term.

[6] British Standards Institution, 2009 and 2014. British Standard 5228: 2009 +A1 2014 Code of practice for noise and vibration control on construction and open sites. BSI.

[7] Department of Environment, 1988. Calculation of Road Traffic Noise, HMSO.

[8] Design Manual for Roads and Bridges, Volume 11 Environmental Assessment, Section 3 Environmental Assessment Techniques, Part 7 Noise and Vibration

3. METHODOLOGY

3.0.1 The following section outlines the methodology applied to identify and assess the potential noise impacts likely to result from the proposed development.

3.2 Study Area

3.2.1 The study area incorporates the application site and the potential impacts of the construction works associated with the proposed development at the nearest sensitive receptors on Old Slade Lane (approximately 400 m from the site at the closest point). Receptors of greater distance from site are not expected to be adversely affected by construction noise.

3.2.2 Demolition of the current facility would be carried out by Heathrow Airport Limited as part of their expansion proposals. As such, the potential noise and vibration impacts arising from demolition works were not taken into account in this assessment.

3.2.3 The study area was defined and agreed with consultees prior to undertaking the assessment.

3.3 Consultation with Slough Borough Council

3.3.1 The Environmental Health team at Slough Borough Council were consulted by email on 26 February 2019 and 4 March 2019 to agree the assessment methodology and criteria. The following was agreed:

i. Noise measurements should be measured and interpreted in accordance with BS7445 *Description and Measurement of Environmental Noise*;

ii. Based on the noise survey data, plant a BS4142:2014 assessment would be undertaken to assess the potential impact of noise on the nearest receptor location (Old Slade Lane);

iii. No baseline monitoring would be carried out at receptor locations to the west of the proposed site, as the receptors are deemed to be of sufficient distance from the site to not be affected by plant noise (nearest receptor to the west is circa. 1.3km from the site);

iv. A quantitative assessment of the worst-case construction activities would be undertaken.

Details of the consultation are provided in Appendix 1.

3.4 Baseline Characterisation

3.4.1 A baseline noise survey was carried out at the nearest NSRs and across the application site, to quantify the prevailing ambient and background noise levels during daytime and night-time periods. The purpose of the baseline survey was to establish the ambient noise level to inform the assessment criteria for construction noise effects and operational plant noise effects.

3.4.2 Benchmarking measurements of current site noise emissions have been completed. The results of these measurements will be input to the operational noise assessment, so that operational noise impacts can be predicted.

3.5 Construction Noise and Vibration Assessment

Construction Noise

3.5.1 The construction works associated with the proposed development will involve the use of a variety of working methods which will change throughout the construction period. Therefore, noise levels from the works are likely to vary significantly over time as the type of construction activities change.

3.5.2 The exact working methodology and plant to be employed during construction has not been established at this stage in the design. However, following best practice, an estimate of the expected noise levels over a representative period had been undertaken using assumed plant items and the associated noise emission data from BS 5228:2009+A1:2014.

3.5.3 The significance criteria for construction noise levels at the NSRs have been established by reference to ABC method described in BS 5228:2009+A1:2014. The thresholds are made relative to the pre-existing ambient noise levels at assessment locations, as shown in Table 3.1.

Table 3.1 BS5228 'ABC' Method for Construction Noise

Assessment period	Threshold values, $L_{Aeq,T}$ (dB)		
	Category A	Category B	Category C
Daytime (07:00 – 19:00) Saturday (07:00 – 13:00)	65	70	75
Evenings (19:00 – 23:00) Saturdays (13:00 – 23:00) Sundays (07:00 – 23:00)	55	60	65
Night time (23:00-07:00)	45	50	55

3.5.4 A potential significant noise effect is indicated when the construction noise exceeds the threshold level for the category appropriate to the ambient noise level:

i. Threshold values of Category A for construction noise should be used when the pre-existing ambient noise level, rounded to the nearest 5 dB, is less than those values shown under Category A;
ii. Threshold values of Category B should be used when pre-existing ambient noise level, rounded to the nearest 5 dB, is equal to values in Category A;
iii. Threshold values of Category C should be used when pre-existing ambient noise level, rounded to the nearest 5 dB, is more than values in Category A.

3.5.5 Construction noise predictions have been based on the methodology contained within BS 5228:2009+A1:2014. This enables predictions to be made of the noise emissions from the construction activities for given distances from the application site boundary.

Construction Traffic Noise

3.5.6 Noise levels generated by construction traffic on the local highways have been calculated following the haul route method set out in BS5228:2009+A1:2014 and assessed cumulatively with on-site noise emissions.

Construction Vibration

3.5.7 The nearest receptors to the site are deemed to be of sufficient distance from the application site to not be adversely affected by demolition and construction vibration. Therefore, a vibration assessment is not provided in this report.

3.6 Operational Noise Assessment

3.6.1 The operational noise assessment will comprise:

i. Setting noise limits from fixed plant and site processes, using the methodology of BS4142:2014;
ii. Prediction of plant and site process noise emissions to the nearest sensitive receptors; and
iii. Assessment of road traffic noise from the new site access road.

3.6.2 Assessment of operational vehicles on the existing road network is not considered as the number, frequency, and itinerary of vehicles accessing the site is not expected to change from current operations, once operating from the proposed site.

Operational noise limits

3.6.3 Operational noise limits will be set based on the background noise levels measured during the baseline survey. In accordance with BS4142:2014, the rating noise level limits will be set equal to the representative background noise levels, allowing for any penalties for acoustic characteristics of the noise.

Noise emissions from plant and site processes

3.6.4 Using the benchmarking measurement results, a noise prediction model of the site has been built to predict noise emissions to the nearest receptor locations. The model uses the calculation method of ISO9613-2:1996 and allows for the effects of building massing, site topography, ground absorption and any screening.

Development generated traffic

3.6.5 Road traffic noise levels from the proposed site access road were calculated following the methodology set out in CRTN.

3.6.6 To determine the change in road traffic noise level, the Basic Noise Level (as defined in CRTN) prediction has been completed for a notional receptor located 10 m from the edge of the carriageway, at a height 1.5 m above ground level. The change in Basic Noise Level due to the proposed development has been assessed based on the comparing the predicted L_{A10} dB noise

level from vehicles using the site access road to the existing L_{A10} dB noise level along Colnbrook By-Pass. The change in Basic Noise Level was then assessed against the long term DMRB criteria.

3.7 Significance Criteria

Demolition and Construction Noise

3.7.1 Table 3.2 details the significance of effects for demolition and construction noise.

Table 3.2 Demolition and construction noise significance criteria

Description	Magnitude of impact	Adverse effect level
Predicted construction noise levels are less than or equal to the threshold value at receptor	Negligible	NOEL
Predicted construction noise levels are ≤5 dB above the threshold value at receptor	Low	LOAEL
Predicted construction noise levels are 5-10 dB above the threshold value at receptor	Medium	SOAEL
Predicted construction noise levels are above the threshold value at receptor by 10 dB or more	High	SOAEL

Operational Noise

3.7.2 Table 3.3 details the significance of effects for operational noise based on:

i. The numerical difference between predicted Rating Level and the prevailing Background Level at a receptor and the criteria from BS4142:2014; and
ii. The difference in the measured and predicted $L_{A10,18hour}$ road traffic noise level for the site access road and the DMRB long term criteria.

Table 3.3 Operational noise significance criteria

Description	Magnitude of impact	Adverse effect level
Predicted Rating Level is 10 dB or more below the prevailing Background Level at the receptor. No increase in $L_{A10,18hr}$ traffic noise in the long-term.	No Effect	-
Predicted Rating Level is between 5 dB and 10 dB below the prevailing Background Level at the receptor. OR A 0.1 dB - 2.9 dB increase in $L_{A10,18hr}$ traffic noise in the long-term.	Negligible	NOEL
Predicted Rating Level is between 0 dB and 5 dB below the prevailing Background Level at the receptor. OR A 3.0 dB - 4.9 dB increase in $L_{A10,18hr}$ traffic noise in the long-term.	Low	LOAEL

Description	Magnitude of impact	Adverse effect level
Predicted Rating Level is between 0 dB and 5 dB above the prevailing Background Level at the receptor. OR A 5.0 dB - 9.9 dB increase in $L_{A10,18hr}$ traffic noise in the long-term.	Medium	SOAEL
Predicted Rating Level is ≥5 dB or more above the prevailing Background Level at the receptor. OR A ≥10 dB increase in $L_{A10,18hr}$ traffic noise in the long-term.	High	SOAEL

3.8 Assumptions and Limitations

3.8.1 All reasonable measures have been undertaken to reduce uncertainty in the baseline noise survey data and the calculations detailed in this report.

3.8.2 The existing facility was operational during the baseline noise measurements. However, it is considered that the contribution of the existing facility to the noise climate at the nearest noise sensitive receptors is negligible. As such, should the new proposed and existing facility be both operational at the same time, it would not result in additional noise impacts.

3.8.3 Uncertainty has been minimised by completing unattended measurements over daytime, evening, weekend and night-time periods. Attended measurements were completed (where possible) at the nearest receptor location to support the unattended measurements.

3.8.4 Results have been rounded to the nearest A-weighted decibel.

3.8.5 Construction work audible outside of the site boundary will take place during standard hours, e.g. 07:00-19:00 hrs Monday-Saturday, with no work on Sundays or public holidays. Delivery of oversize plant and equipment, internal fit out, internal works and other non-intrusive works may take place outside of these times. Extraordinary events such as concrete pours may also need to take place outside these hours as by their nature they need to be continuous.

3.8.6 Ambient noise measurements used to determine construction noise threshold values for daytime and evening and weekends (following guidance from BS5228) were taken between 21:00 and 21:35 (evening period). This is considered representative of typical evening and weekend ambient noise levels, and representative of a worst-case scenario of daytime ambient noise levels as they are expected to be higher (which is confirmed based on the results of unattended continuous monitoring).

3.8.7 We understand that during peak construction period, 340 daily HGV movements (170 each ways) are expected. We have assumed this number for all construction activities to be representative of a worst-case scenario.

3.8.8 The noise prediction model was calibrated to the noise survey results and accounts for intervening topography and existing building massing. The model uses the calculation method of ISO9613-2:1996.

3.8.9 Plant noise emissions are based on benchmarking measurements from the existing facility.

3.8.10 It is assumed that attenuators would be fitted in the chimney stack to reduce noise emissions. Based on experience on similar projects, we have assumed a sound power of 89 dB L_{wA} at the top of the stack in our noise model.

3.8.11 The assessments and calculations undertaken in this report are based on data and plans of the proposed development provided by the client and consultees. Should any of these change significantly, the results of the assessments may not be valid and would need to be updated.

4. BASELINE NOISE SURVEY

4.1 Survey methodology

4.1.1 An unattended noise monitor was installed at LT1 (as shown on Figure 4.1) between Friday 08/03/2019 and Wednesday 13/03/2019.

4.1.2 LT1 was installed at a height of 1.5m above local ground level and under free-field conditions.

4.1.3 Noise levels were monitored continuously over the survey period and averaged over 15-minute intervals.

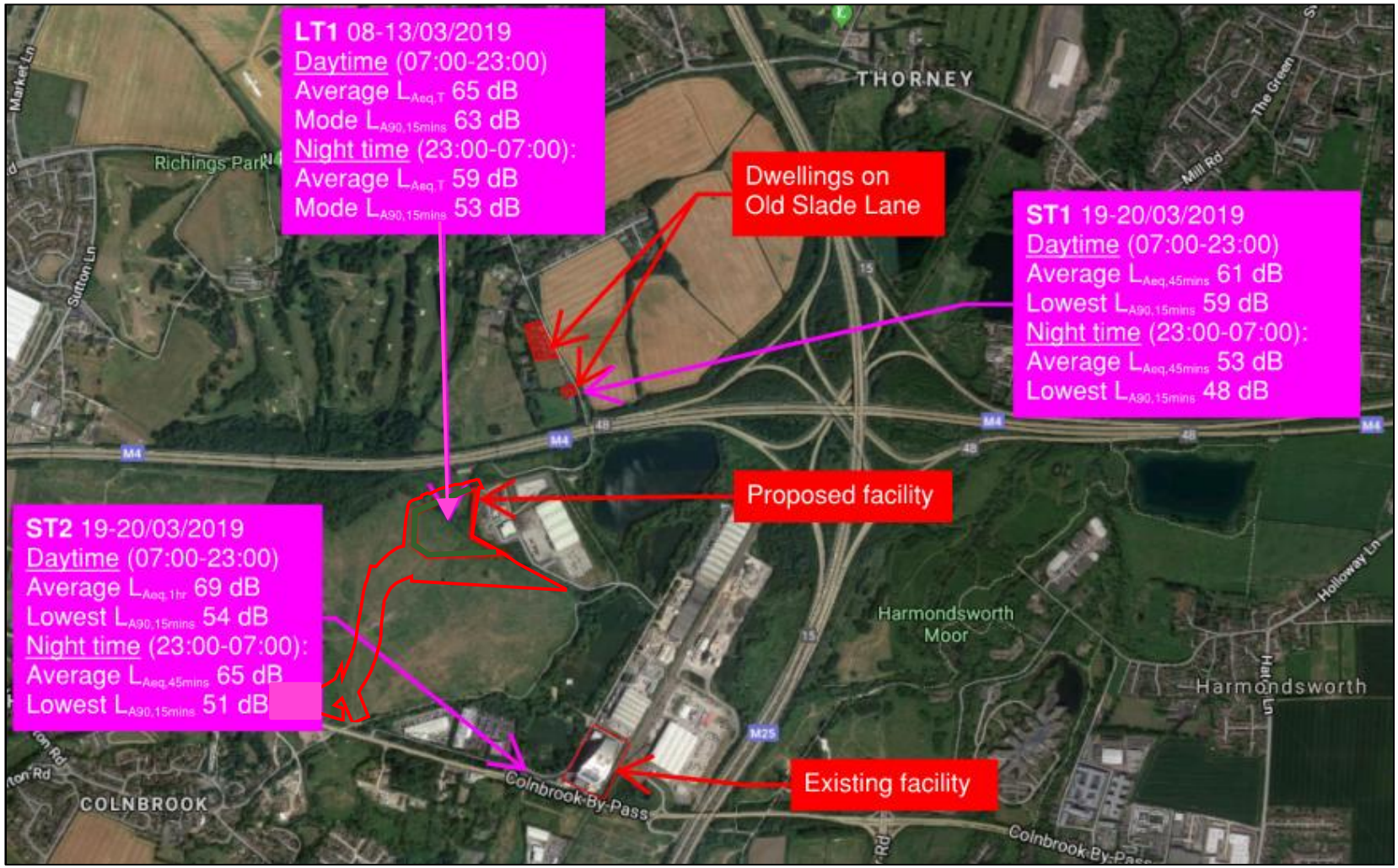
4.1.4 The sound level meter calibration was checked upon installation and upon completion of the surveys. No significant drift in calibration was recorded.

4.1.5 Attended measurements of 15 minutes in duration were taken at two positions (as shown on Figure 4.1) on 19/03/2019 and 20/03/2019:

i. ST1: representative of noise levels affecting the nearest noise sensitive receptors on Old Slade Lane.
ii. ST2: representative of noise levels at the Colnbrook By-Pass; and

Each measurement was taken at a height of 1.5m above local ground level and under free-field conditions.

Figure 4.1 Baseline monitoring locations



4.2 Weather

Start of unattended survey:
Friday 08/03/2019
Dry, partly sunny, ~6°C, wind speed (average) 4.4 m/s, precipitations 0.4 mm,

Unattended survey:
Temperatures in the range of 3-13°C.
Some periods of wind speeds > 5 m/s occurred on each day. Winds were in variable direction.
Some limited periods of light rain occurred on Tuesday 05/03/2019, Thursday 07/03/2019, Friday 08/03/2019 and Sunday 10/03/2019.

End of unattended survey:
Wednesday 13/03/2019
Dry, mostly sunny, ~6°C, wind speed (average) 9.1 m/s, no precipitations.

Attended survey:
Tuesday 19/03/2019 to Wednesday 20/03/2019
Dry, partly sunny, ~7°C, wind speed (average) 3.3 m/s, no precipitations.

High wind speeds (>5 m/s) may have affected the results of the unattended measurements. As such, only attended measurement results have been used in the assessment

4.3 Equipment

4.3.1 The following measurement equipment was used:

Unattended survey:

i. Bruel & Kjaer Class 1 Sound Level Meter type 2270 (serial no. 2644605) and associated microphone type 4189 (serial no. 2877222);
ii. Bruel & Kjaer Class 1 field calibrator type 4231 (serial no. 2642788).

Attended survey

i. Norsonic Class 1 Sound Analyser Nor140 (serial no. 6951) and associated microphone Nor1225 (serial no. 285522).
ii. Norsonic Class 1 filed calibrator type 1251 (serial no. 34964).

4.3.2 Calibration certificates are available upon request.

4.4 Attended noise survey results

4.4.1 A summary of the attended survey results is shown on Table 4.1.

Table 4.1 Summary of attended noise survey results

Measurement position	Period	Representative $L_{Aeq,T}$ (dB)	Highest L_{AFmax} (dB)	Lowest $L_{A90,15mins}$ (dB)	Lowest $L_{A10,15mins}$ (dB)
ST1 (Old Slade Lane)	Daytime (07:00-23:00)	61	73	59	63
	Night time (23:00-07:00)	53	72	48	55

Measurement position	Period	Representative $L_{Aeq,T}$ (dB)	Highest L_{AFmax} (dB)	Lowest $L_{A90,15mins}$ (dB)	Lowest $L_{A10,15mins}$ (dB)
ST2 (Colnbrook Lane)	Daytime (07:00-23:00)	68	84	55	72
	Night time (23:00-07:00)	65	83	51	67

4.4.2 The noise climate at ST1 was dominated by traffic noise from the M4 and M25 motorways and aircraft noise from Heathrow Airport between 22:00-23:00. Some noise intermittent noise from vehicles on Old Slade Lane was also audible. No noise from the existing Lakeside EfW plant was audible.

4.4.3 The noise climate at ST2 was dominated by traffic noise from the Colnbrook By-Pass, noise from HGVs driving through Lakeside Road, some industrial nose from the Grundon Plant to the north west, and traffic noise from the M25 motorway. No noise from the existing Lakeside EfW plant was audible.

4.5 Unattended noise survey results

4.5.1 The unattended survey results are shown in Figure 4.2. A summary of the results of attended and unattended measurements is provided in Appendix 2.

4.5.2 The noise climate LT1 was dominated by traffic noise from the M4 motorway. Some aircraft noise from Heathrow Airport was audible. No noise from the existing Lakeside EfW plant was audible.

4.5.3 Typical daytime average noise levels ranged from 62-66 dB $L_{Aeq,16hour}$. Daytime background noise levels ranged from 52-66 dB $L_{A90,15min}$. Daytime maximum noise levels were dictated by loud individual vehicles on the M4 motorway.

4.5.4 Night-time average noise levels ranged from 55-62 dB $L_{Aeq,8hour}$. Night-time background noise levels ranged from 50-65 dB $L_{A90,15min}$. Night-time maximum noise levels were expected to be dictated by loud individual vehicles on the M4 motorway.

4.6 Benchmark noise measurements

1.1.1 Benchmark noise measurements were undertaken at the existing facility to inform and refine the noise emissions calculations for the new proposed facility.

1.1.2 We understand that new plant will be used for the proposed facility, and that no or limited parts of the existing facility will be re-used. However, the data acquired during the measurements will yield valuable information on the spatial distribution of noise levels within and outside the facility, as well as spectral data which is not usually available for new plant items. The benchmark measurements will greatly reduce possible uncertainty in the noise emissions calculations for the new facility.

1.1.3 A summary of the benchmark noise measurements results is shown in Appendix 3.

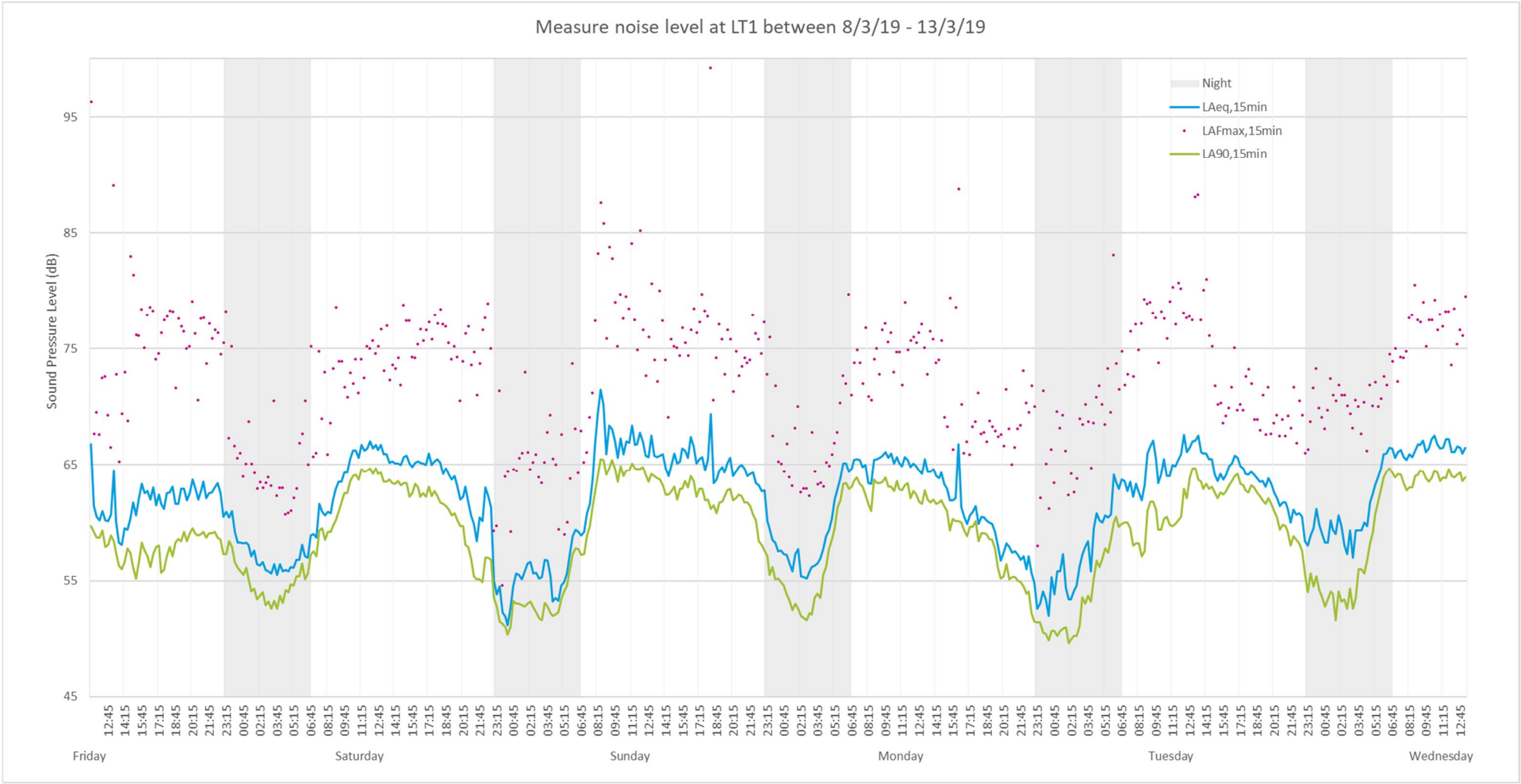


Figure 4.2 Unattended survey results

5. CONSTRUCTION NOISE ASSESSMENT

5.1 Construction noise emissions limits

5.1.1 Construction noise emission limits have been calculated based on the methodology set out in BS5228 and measured ambient noise levels on site. The limits are summarised in Table 5.1.

Table 5.1 Construction noise limits at NSR

NSR considered (corresponding noise survey location)	Prevailing ambient noise level during daytime period, $L_{Aeq,T}$ (dB)	Prevailing ambient noise level during evening and weekend periods, $L_{Aeq,T}$ (dB)	BS5228 noise emission category	Construction noise threshold at NSR, $L_{Aeq,T}$ (dB)
Old Slade Lane (ST1)	61	61	A (daytime) C (evening & weekends)	65

5.1.2 Noise emissions during site preparation and construction activities (including site traffic) have been calculated at the nearest NSRs. The emissions were calculated based on a number of assumptions relating to construction methods and plant. The actual construction noise levels may vary depending on the type of activity, periods of operation, and distances between source of noise and receivers. However, conservative assumptions have been made regarding these parameters.

5.1.3 Noise emissions from each of the following anticipated construction activities was calculated:

i. Civil works (2020-2022), including site establishment, site preparation, earthworks, substructure works;
ii. Construction of new access road (2020);
iii. External works and erection of equipment (2021-2022);
iv. Erection of steel structure and cladding (2022).

5.1.4 We assume that the construction area would be surrounded by standard site hoarding, and that the Main Contractor would adopt Best Practicable Means (BPM).

5.2 Construction noise assessment

5.2.1 Construction noise emissions levels were calculated following the methodology from BS5228:2009. The total noise levels at 10 m from the construction area for each activity was determined, and propagation calculations are carried out to determine the noise levels at a receptor. Details of the plant items used in our calculations for each activity are shown in Appendix 4.

5.2.2 Due to local ground condition and the location of the M4 motorway, there is no direct line of sight between the construction site and the receptors on Old Slade Lane. As such, based on BS5228, a 10 dB screening correction has been taken in to account in our calculations for all construction activities, except the erection of the steel structure and cladding. The majority of the works during the latter would be undertaken at high level, so that the works would be just visible from the receptor. As such, a 5 dB screening correction has been taken into account for this activity. Propagation on hard ground was assumed to represent a worst-case scenario.

5.2.3 The results of the construction noise assessment are shown in Table 5.2.

Table 5.2 Construction noise assessment

Construction activities	Noise level at 10 m per activity, $L_{Aeq,T}$ (dB)	NSR on Old Slade Lane (min. separating distance 390 m), $L_{Aeq,T}$ (dB)
Civil works	98	59
Construction of new access road	96	57
External works and erection of equipment	95	56
Erection of steel structure and cladding	95	61

5.2.4 The results of the calculations show that the predicted construction noise levels at the NSR are below the limits set in Table 5.1. As such, no significant noise impacts are predicted for any construction activities.

5.2.5 Vehicles and cranes used in the construction works will be fitted with reversing alarms and horns for safety. Reversing alarms can generate a sound level of up to 90 dB(A) at 1 m from the source. Assuming unscreened hemispherical propagation over 390 m, the resulting noise level at the NSR would be up to 30 dB (60 dB atmospheric attenuation). This is significantly below the construction noise limit and existing ambient noise levels at the NSR, and no noise impacts are predicted from the reversing alarms,

6. OPERATIONAL NOISE ASSESSMENT

6.1 Plant noise assessment

6.1.1 A 3D computer noise model was prepared to calculate the plant noise emissions from the proposed facility at each NSR. Noise levels were predicted at each storey level of the receptors (assuming a ground floor height of 1.5 m and a subsequent storey height of 3 m). The highest predicted noise levels were used in the assessment.

6.1.2 The noise model was done using the proprietary software CADNA-A®. The software implements the common European methods of noise prediction. The noise predictions have been undertaken in accordance with ISO9613-2[9].

6.1.3 The noise model is based on the current site layout plan of the proposed development provided by the Applicant. The topography on and around the site have been modelled using topographical survey information.

6.1.4 The noise sources associated with the facility used in the model were:

- Noise breakout from the Main Facility building;
- Noise breakout from Turbine Hall;
- Noise breakout from High Temperature Incinerator;
- Noise breakout from Transformer and Heat Stations;

[9] International Standards Organisation, 1996. Acoustics - Attenuation of sound during propagation outdoors - Part 2: General method of calculation. ISO

- Air Cooled Condensers;
- Chimney Stack; and
- HGV movements.

6.1.5 Location and details of the noise sources used the model are shown in Appendix 5.

6.1.6 The noise emissions levels for each of the above sources were determined based on the results of the benchmark noise measurements. The highest measured ambient sound level in each area of the facility has been assumed as the reverberant noise. This is considered representative of a worst-case scenario, as large variations of noise levels exist within each area of the facility.

6.1.7 It is assumed that the proposed facility would operate 24/7 with no difference between daytime and night time operation.

6.1.8 Based on the design of the existing facility and the plans of the proposed facility, the following external envelope and mitigation measures were assumed in the model:

- Low level brick finish (extent as shown on elevation drawings) rated at least R_w 45 dB;
- Typical external envelope (including roof) to be composite cladding panel system (or equivalent) rated at least R_w 23 dB;
- Non-acoustic weather louvres set into the façade in all locations (assuming to provide 4 dB attenuation based on past experience);
- 4.5 m tall screen around the top of the Air Cooled Condensers with a minimum density of 7 kg/m^2 and no gaps.
- Standard roller shutter doors rated at least R_w 15 dB; and
- Standard external personal doors rated at least R_w 22 dB;
- Roller doors to the Tipping Hall is considered to be always open.

The noise model took into account all external doors and louvres as shown on the building elevations.

6.1.9 A number of noisy plant and process installations measured during the benchmark measurements had distinctive characteristics such as impulsivity, intermittency, and tonality. Following BS4142, penalties should be added to the specific noise level calculated at a receptor if such features are discernible at the receptor. Subjective assessment of tonality, intermittency, and impulsivity in the direct vicinity (within 50 m) of the existing facility during the benchmark measurements, showed that no such noise characteristics were audible. Furthermore, the noise climate at the NSR is dominated by broadband traffic noise from the motorway, which has the potential to effectively mask other noise sources. It is considered unlikely that acoustic features form the proposed facility would be audible at the NSR, however, a 3 dB penalty has been taken into account in determining the Rating Level at the NSR to allow for other acoustic features which might be readily audible above the existing noise climate.

6.1.10 The results of the noise model are summarised in Table 6.1.

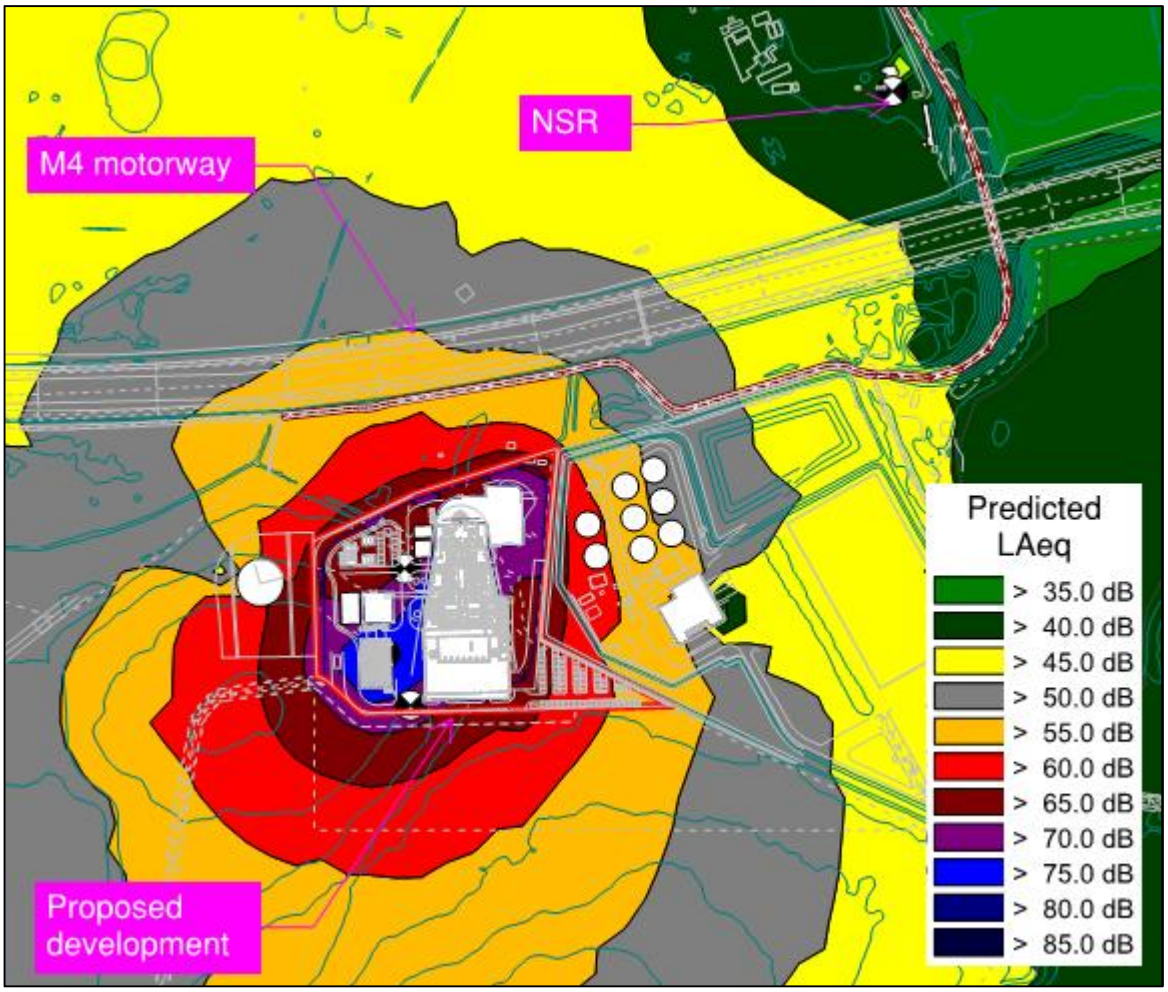
Table 6.1 Operational noise assessment

NSR considered	Period	Background Level, $L_{A90,T}$ (dB)	Predicted Absolute Level, $L_{Ar,T}$ (dB)	Resulting Rating Level, $L_{Ar,T}$ (dB)
Dwellings on Old Slade Lane	Daytime (07:00-23:00)	59	44	47
	Night time (23:00-07:00)	48		

6.1.11 The results of the noise model show that the predicted Rating Level at the nearest NSR is 15 dB and 4 dB below the Background Level for daytime and night time, respectively. This is considered to result in a negligible impact.

6.1.12 A noise propagation map of the proposed facility is shown on Figure 6.1.

Figure 6.1 Predicted noise levels from proposed facility



6.2 Road traffic from the site access road

6.2.1 Based on traffic flow estimates provided by the Traffic Consultant, and following the methodology set out in CRTN, the Basic Noise Level at a nominal receptor 10 m away from the proposed access road was calculated. The results are shown in Table 6.2.

Table 6.2 Basic Noise Level calculation for proposed access road

Estimated AAWT 18 hour on proposed access road			
Total number of vehicles (both ways)	% HGVs	Traffic speed	Calculated Basic Noise Level, L_{10} (dBA)
452	41	30 mph (48 kph)	60

6.2.2 The Basic Noise Level calculated for the proposed access road is at least 5 dB lower than the measured $L_{A10,T}$ for the Colnbrook By-Pass. As such, its impact on the receptors located on the other side of the Colnbrook By-Pass would be negligible.

6.2.3 Due to the large distance between the new access road and the NSR, the noise from traffic on the new access road would be negligible.

7. CONCLUSION

7.0.1 The potential construction and operational noise impacts associated with the proposed new Energy from Waste Facility have been assessed. The results of the assessment show that the new facility will result in no significant adverse noise impacts on the existing noise sensitive receptors. No specific mitigation measures are required to limit noise emissions from the facility. The assessment assumes that the new facility would be a like for like replaced of the existing Lakeside EfW plant.

APPENDIX 1
RECORD OF CONSULATION WITH SLOUGH BOROUGH COUNCIL

This appendix contains three emails, reproduced in chronological order. Sensitive information (including email addresses and phone numbers) have been removed. The body of the emails remain unchanged.

Email 1 – Initial contact from Ramboll Acoustics to SBC
From: David Harbon of Ramboll
Sent: 26 February 2019 14:16
To: Newman Jason of Slough Borough Council
Cc: Francois-Xavier Lallemand of Ramboll
Subject: Lakeside EfW - Noise Impact Assessment Consultation
Importance: High

Dear Jason,

I have been passed your contact details regarding the proposed Lakeside EfW scheme. Ramboll are completing a noise impact assessment to inform the planning application and I would be grateful for your comments and approval on the proposed assessment methodology. Your earliest response would be appreciated as we hope to commence the noise survey W/C 04/03/2019.

A draft EIA scoping report was submitted to Slough Council in late January 2019. The existing facility next to the M25 is proposed to be moved to the site shown in the approximate red line boundary below.

It will be necessary to complete a baseline noise survey at the site and at the nearest receptor locations, so that the potential effect of moving the plant and process equipment to the new location can be assessed. Our proposed monitoring locations are shown on the figure below.

We intend to install an unattended noise monitor at the site boundary to include daytime, evening, night-time and weekend periods. The exact location will be determined once on site due to the need for safe access and a secure location to fix the equipment to. Once the unattended monitor is installed, we propose to complete measurements at the nearest receptor location at Old Slade Lane, and at the existing site entrance. Measurements will be completed during quieter periods of the daytime (21:00-23:00) and during the quietest hours of the night (02:00-04:00). Measurements will be 15-minutes in duration.

We do not intend to monitor at receptor locations to the west of the proposed site, as the receptors are deemed to be of sufficient distance from the site to not be affected by plant noise (nearest receptor to the west is circa. 1.3km from the site).

We have completed benchmarking measurements at the existing facility to determine plant and process noise levels. This data will be used to complete calculations of plant noise emissions to the nearest receptor location.

We will:

- Based on the noise survey data, set plant rating noise levels at the site boundary and at the nearest receptor location, to the methodology of BS4142:2014;
- Predict plant rating noise levels, at the site boundary and at the nearest receptor location, to the methodology of BS4142:2014 and describe the likelihood for impacts at the nearest receptor location;
- If deemed necessary, recommend outline mitigation measures to reduce the potential noise impacts;
- Assess noise from construction vehicles accessing the site to the haul route method of BS5228:2009+A1:2014. An assessment of construction noise from the site has been scoped out as each of the nearest receptors are over 300m from the proposed development site; and
- Assess road traffic noise from the new access road (shown in blue on the figure above) to CRTN and DMRB. Please note that the access road layout/alignment is indicative at present and subject to change. We propose to take the predicted L_{A10} dB from the access road and compare this to the existing L_{A10} dB as measured at the existing site entrance (deemed representative of the noise levels at receptors along Colnbrook By-Pass). The change in the L_{A10} dB will be assessed to the guidance of DMRB. It is not expected that the new site will generate an increase in road traffic on existing local road network, as the same number of vehicles will access the site and site processes are not proposed to change. Therefore, an assessment of road traffic noise levels in the local road network has been scoped out.

We will not be assessing the cumulative impact of the proposed third runway at Heathrow.

I would be grateful for your comments and approval of the above methodology.

Thank you and I hope to hear from you shortly.

Kind regards

David Harbon

MSc CEng MIOA

Principal Consultant

Acoustics

From: Norfolk Sophia of Slough Borough Council
Sent: 04 March 2019 10:48
To: David Harbon of Ramboll
Cc: Newman Jason of Slough Borough Council
Subject: RE: Lakeside EfW - Noise Impact Assessment Consultation

Hi David,

Apologies for the delay in my response.

Overall, I am happy with the assessment approach, but I have a few comments.

- The map which shows monitoring locations is unclear – could I please have a map which shows the monitoring locations in more detail?

- The noise assessment should include construction noise originating from the site. Piling operations and reverse bleepers on construction vehicles may be audible from over 300m, therefore the nearest receptor will be impacted.
- Noise exposure from construction vehicles travelling to the site on local residents should be included in the assessment, with reference to BS 8223:2014 “Sound Insulation and Noise Reduction for Buildings”
- Noise measurements should be measured and interpreted in accordance with BS 7445 “Description and Measurement of Environmental Noise”
- Noise level modelling, such as CadnaA, should be completed to determine noise propagation of the future plant and impact on surrounding receptors

Kind regards,

Sophia Norfolk
Technical Officer – Air Quality and Environmental Noise

Slough Borough Council
Environmental Quality Team
Major Infrastructure Projects
Regeneration Directorate

Email 3 – Answer from Ramboll to SBC comments on assessment methodology
From: David Harbon of Ramboll
Sent: 05 March 2019 11:04
To: Norfolk Sophia of SBC
Cc: Francois-Xavier Lallemand of Ramboll; Newman Jason of SBC
Subject: RE: Lakeside EfW - Noise Impact Assessment Consultation

Hi Sophia,

Thank you for your response. It’s much appreciated.

I have provided comments/responses to your email in red below.

If you have any further queries please let me know. Your earliest response would be appreciated.

Kind regards
David Harbon

MSc CEng MIOA
Principal Consultant
Acoustics

From: Norfolk Sophia
Sent: 04 March 2019 10:48
To: David Harbon
Cc: Newman Jason
Subject: RE: Lakeside EfW - Noise Impact Assessment Consultation

Hi David,

Apologies for the delay in my response.

Overall, I am happy with the assessment approach, but I have a few comments.

- The map which shows monitoring locations is unclear – could I please have a map which shows the monitoring locations in more detail?

The monitoring locations shown are indicative as these will be subject to safe access on site (without the risk of trespass). The site boundary location will be subject to having a location to fix the unattended monitoring equipment to. The position at the nearest receptor location is likely to be on Old Slade Lane, just slightly south of the receptor location (due to safe access). The site entrance location will be intended to measure the L_{A10} road traffic noise levels from the Colnbrook Bypass. The noise levels are expected to be consistent along this stretch of road. The proposed location will provide a safe location and an area of land that we will have access to.

- The noise assessment should include construction noise originating from the site. Piling operations and reverse bleepers on construction vehicles may be audible from over 300m, therefore the nearest receptor will be impacted.

It is unlikely that based on the distances to receptors that construction noise will impact on the nearest sensitive receptors. However, we will provide a quantitative assessment of the worst-case activities.

- Noise exposure from construction vehicles travelling to the site on local residents should be included in the assessment, with reference to BS 8223:2014 “Sound Insulation and Noise Reduction for Buildings”

This is proposed to be assessed in accordance with the haul route method to BS5228:2009+A1:2014 and cumulatively with noise from site operations.

- Noise measurements should be measured and interpreted in accordance with BS 7445 “Description and Measurement of Environmental Noise”

Noted.

- Noise level modelling, such as CadnaA, should be completed to determine noise propagation of the future plant and impact on surrounding receptors

Noise modelling software will be used for these calculations to inform the BS4142:2014 assessment.

Kind regards,

Sophia Norfolk
Technical Officer – Air Quality and Environmental Noise

Slough Borough Council
Environmental Quality Team
Major Infrastructure Projects
Regeneration Directorate

APPENDIX 2
BASELINE NOISE SURVEY RESULTS

The results of the baseline attended measurements are shown in the table below:

Location of measurement	Start time	Duration, mm:ss	L_{AFmax} (dB)	$L_{Aeq,T}$ (dB)	$L_{A10,T}$ (dB)	$L_{A90,T}$ (dB)
Daytime period (07:00-23:00)						
ST1 - Old Slade Lane	19/03/2019 21:00	15:00	73	63	63	60
	19/03/2019 21:15	15:00	71	61	63	59
	19/03/2019 21:30	15:00	70	61	63	60
ST2 - Site entrance	19/03/2019 22:15	15:00	84	71	75	60
	19/03/2019 22:30	15:00	81	69	73	58
	19/03/2019 22:45	15:00	84	67	72	58
Night time period (23:00-07:00)						
ST1 - Old Slade Lane	20/03/2019 02:00	15:00	59	53	55	50
	20/03/2019 02:15	15:00	58	52	55	48
	20/03/2019 02:30	15:00	72	53	55	50
ST2 - Site entrance	19/03/2019 23:00	15:00	83	68	72	55
	20/03/2019 03:15	15:00	79	64	67	51
	20/03/2019 03:30	15:00	83	65	69	51
	20/03/2019 03:45	15:00	82	65	69	53

Octave band data available upon request.

APPENDIX 3
SUMMARY OF BENCHMARK NOISE MEASUREMENTS RESULTS

File reference	Location	Notes	Duration (hh:mm:ss)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
190221 001	Tipping hall	General operation, middle of the space, representative of reverberant level	00:06:01	75	88
190221 002	Bunker	Bottom ash, representative of reverberant level	00:05:02	73	86
190221 003	Main plant area	Bottom ash conveyors at 1 m	00:05:00	77	84
190221 004	Main plant area	Level 17.5m	00:05:00	72	83
190221 005	Main plant area	Ash breaker hammer at 1 m	00:00:46	82	87
190221 006	Main plant area	Same location without breakers	00:05:00	72	82
190221 007	Main plant area	Top of bag filters at 1 m	00:05:00	82	97
190221 009	Main plant area	Outside incinerator viewing window at 1 m	00:05:00	81	86
190221 010	Main plant area	Fan level 6, east side	00:05:00	81	95
190221 011	Main plant area	Crane control room, reverberant level	00:02:02	47	64
190221 012	Main plant area	Ground floor by bottom ash sieve at 1 m	00:05:00	80	88
190221 013	Main plant area	Ground floor, hydraulic oil tank at 1 m	00:00:30	81	82
190221 014	Main plant area	Ground floor, primary fan exhaust at 1 m (noisiest side)	00:00:30	80	81
190221 015	Main plant area	Compressor room, reverberant level	00:02:00	87	91
190221 016	Main plant area	Feedwater pumps at 1 m	00:01:00	88	89
190221 017	Main plant area	Feedwater pumps at 1 m	00:00:30	79	82
190221 018	Main plant area	Ash handling system at 2 m	00:01:00	84	85
190221 019	Main plant area	Induced draft fans at 1 m	00:01:00	86	87
190221 020	Air Cooled Condensers	1.5 m above fans	00:01:00	79	88
190221 021	Air Cooled Condensers	Below fans, 1.5 m above ground	00:00:30	79	80
190221 022	Condensate pit	By main pump at 1 m	00:00:30	87	87
190221 023	Condensate pit	Other side of pit	00:00:30	81	83
190221 024	Turbine Hall	Reverberant level south side	00:05:00	78	81
190221 025	Turbine Hall	Reverberant level, middle	00:01:04	81	82
190221 026	Turbine Hall	Reverberant level, north side	00:05:00	80	81
190221 028	Electrical room	Inverter room, stepdown transformer, reverberant level	00:05:00	88	90

File reference	Location	Notes	Duration (hh:mm:ss)	$L_{Aeq,T}$ (dB)	L_{AFmax} (dB)
190221 029	Electrical room	Main switchrooms, reverberant level	00:05:00	77	79
190221 031	South west corner of existing site, unscreened location		00:10:01	69	79
190221 034	North east corner of existing site, unscreened location		00:02:00	75	78
190221 036	15 m from middle of east façade		00:10:00	67	80
190221 037	2 m away from compressor louvres		00:00:30	71	73
190221 038	CWI primary storage, reverberant level		00:01:00	74	85
190221 040	CWI middle of plant area, reverberant level		00:01:00	81	85
190221 042	CWI ground floor, reverberant level		00:01:00	79	82
190221 043	Lakeside Road, access road to education centre entrance		00:10:00	67	80

Octave band data available upon request

APPENDIX 4
DETAILS OF CONSTRUCTION NOISE ASSESSMENT

Activity	Plant	Source data ref	Qty	Typical Noise level at 10m for one plant item operating dB(A)	Estimated Percentage on time	L_{Aeq} at 10m for all plant item dB(A)	Noise level per activity dB(A)
Civil works	Mobile crane	C4.38	1	78	100	78	98
	Lorry	C6.21	28	80	100	94	
	Generator	C8.24	1	59	100	59	
	Small excavator	C2.24	1	73	100	73	
	Hammer	C1.19	1	69	100	69	
	Dozer	C2.10	1	80	100	80	
	Tracked excavator	C2.3	2	78	100	81	
	Wheeled loader	C2.27	2	80	100	83	
	Vibratory loader	C5.20	1	75	100	75	
	Nail gun	C4.95	1	73	100	73	
	Hydraulic hammer piling rig	C3.1	4	89	80	94	
	Tracked excavator	C3.24	2	74	100	77	
	Concrete pump	C3.25	2	78	100	81	
	Concrete mixer	C4.27	2	79	100	82	
	Poker vibrator	C4.33	2	78	100	81	
	Dump truck	C2.30	4	79	100	85	
External works and erection of equipment + Erection of steel structure and cladding	Mobile telescoipic crane	C4.46	1	67	100	67	95
	Tower crane	C4.49	1	77	100	77	
	Lifting platform	C4.57	1	67	100	67	
	Lorry	C6.21	28	80	100	94	
	Tracked excavator	C2.14	1	79	100	79	
	Generator	C4.86	1	65	100	65	
	Compressor	C5.5	1	65	100	65	
New access road	Dozer	C2.10	1	80	100	80	96
	Tracked excavator	C5.18	1	80	100	80	
	Articulated dump truck	C5.16	4	81	100	87	

	Lorry	C6.21	28	80	100	94
	Vibratory roller	C5.20	1	75	100	75
	Asphalt paver + tipper lorry	C5.31	1	77	100	77
	Circular saw	C4.72	1	79	100	79

APPENDIX 5
DETAILS OF NOISE PROPAGATION MODEL

RAMBOLL

Project Title:		REPLACEMENT OF LAKESIDE EFW	
Project No:		1620005898	
Sketch No:		NV report Appendix 5	
Title:		Details of noise Propagation model	
Eng:	Rev:	Date:	Checked:
FXL	**I01**	**10/05/2019**	**CB**

Chimney stack
Height in model: 55 m
Sound power (based on past experience on similar projects): 89 dB L_{wA}

Heat Stations
Height in model: 8-9.5 m
Internal noise level (estimated based on measurements): 87 dB LAeq,T

HGV movements
Source height: 2 m
Speed: 8 km/h
No. of HGV per hour (based on TA): 20

Turbine Hall
Height in model: 15 m
Internal noise level (measured): 82 dB $L_{Aeq,T}$

High Temperature Incinerator
Height in model: 20.5 m
Internal noise level (measured): 81 dB $L_{Aeq,T}$

Transformer room
Height in model: 7.5 m
Internal noise level (estimated based on measurements): 87 dB $L_{Aeq,T}$

Main plant area
Height in model: 42 m
Internal noise level (measured): 82 dB $L_{Aeq,T}$

Ancillary buildings
No noise emissions

Office
No noise emissions

Bunker and Tipping Hall
Height in model: 42 m
Internal noise level (measured): 75 dB $L_{Aeq,T}$

Electrical and ancillary rooms
Height in model: up to 7.5 m
Internal noise level (measured): 87 dB $L_{Aeq,T}$

Air Cooled Condensers
Height: 11 m
Sound power per m^2 (estimated based on measurements): 82 dB L_{wA}
Height of screen: 4.5 m above fans

WRLTH
HTI
IDF
FGT
2308
Heat Station 01
Heat Station 02
Maintenance Car Park -18
Switch Gear
Transformer
Maintenance Portakbins
Maintenance Set down and turning
Maint' Storage
Storage Tank
Pipe Bridge
Maintenance Workshops
Turbine
Maintenance Access
WB - OUT
Gas Oil Tank
2 Stream EfW
Maintenance Access
ACC
Set Down Area
Bunker
Office
Additional Office Parking Under Ramp - 22
1:12 Ramp
Gate House
Main EfW Access
Metal Bin Store area
Public/Staff + CWI Optional Access
El Sub Sta
El Sub Sta
Tanks
Motorcycles
Dis. P
Dis. P
Mini buses)
Gate House
Key
2 Stream EfW

a	Waste Truck
b	Bottom Ash
c	ARCr
d	Diesel Oil Truck
e	Lime/Activated Carbon Truck

0 5 10 15 20 30 40 50

CROWTHER ARCHITECTS ASSOCIATES
CROWTHER ASSOCIATES ARCHITECTS LLP
PELHAM HOUSE 25 PELHAM SQUARE BRIGHTON BN1 4ET
T: 01273 695535 www.crowtherassociates.co.uk

DRAWING: Proposed Site Layout Energy From Waste

CLIENT: Lakeside EFW	JOB NO.: C1816	DRAWING NO: (08)001	REV.: D
PROJECT: Lakeside 2	SCALE: 1:500@A1	DATE: Oct 2018	DRAWN: JJ

CROWTHER ASSOCIATES